

for testing in accordance with this subpart.

(i) *Record retention.* Following each design qualification test and each periodic retest on a Large Packaging, a test report must be prepared. The test report must be maintained at each location where the Large Packaging is manufactured and each location where the design qualification tests are conducted, for as long as the Large Packaging is produced and for at least two years thereafter, and at each location where the periodic retests are conducted until such tests are successfully performed again and a new test report produced. In addition, a copy of the test report must be maintained by a person certifying compliance with this part. The test report must be made available to a user of a Large Packaging or a representative of the Department upon request. The test report, at a minimum, must contain the following information:

- (1) Name and address of test facility;
- (2) Name and address of applicant (where appropriate);
- (3) A unique test report identification;
- (4) Date of the test report;
- (5) Manufacturer of the packaging;
- (6) Description of the packaging design type (*e.g.*, dimensions, materials, closures, thickness, etc.), including methods of manufacture (*e.g.*, blow molding) and which may include drawing(s) and/or photograph(s);
- (7) Maximum capacity;
- (8) Characteristics of test contents, *e.g.*, viscosity and relative density for liquids and particle size for solids;
- (9) Mathematical calculations performed to conduct and document testing (for example, drop height, test capacity, outage requirements, etc.);
- (10) Test descriptions and results; and
- (11) Signature with the name and title of signatory.

[75 FR 5400, Feb. 2, 2010, as amended at 75 FR 60339, Sept. 30, 2010; 76 FR 3389, Jan. 19, 2011]

#### **§ 178.960 Preparation of Large Packagings for testing.**

(a) Except as otherwise provided in this subchapter, each Large Packaging and package must be closed in preparation for testing and tests must be carried out in the same manner as if pre-

pared for transportation, including inner packagings. All closures must be installed using proper techniques and torques.

(b) For the drop and stacking test, inner receptacles must be filled to not less than 95 percent of maximum capacity (*see* § 171.8 of this subchapter) in the case of solids and not less than 98 percent of maximum in the case of liquids. Bags must be filled to the maximum mass at which they may be used. For Large Packagings where the inner packagings are designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The material to be transported in the packagings may be replaced by a non-hazardous material, except for chemical compatibility testing or where this would invalidate the results of the tests.

(c) If the material to be transported is replaced for test purposes by a non-hazardous material, the material used must be of the same or higher specific gravity as the material to be carried, and its other physical properties (grain, size, viscosity) which might influence the results of the required tests must correspond as closely as possible to those of the hazardous material to be transported. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they do not affect the test results.

(d) Paper or fiberboard Large Packagings must be conditioned for at least 24 hours immediately prior to testing in an atmosphere maintained—

(1) At 50 percent  $\pm$  2 percent relative humidity, and at a temperature of 23 °C  $\pm$  2 °C (73 °F  $\pm$  4 °F). Average values should fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to  $\pm$  5 percent relative humidity without significant impairment of test reproducibility;

(2) At 65 percent  $\pm$  2 percent relative humidity, and at a temperature of 20 °C  $\pm$  2 °C (68 °F  $\pm$  4 °F), or 27 °C  $\pm$  2 °C (81 °F  $\pm$  4 °F). Average values should fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to

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vary by up to  $\pm 5$  percent relative humidity without significant impairment of test reproducibility; or

(3) For testing at periodic intervals only (*i.e.*, other than initial design qualification testing), at ambient conditions.

### § 178.965 Drop test.

(a) *General.* The drop test must be conducted for the qualification of all Large Packaging design types and performed periodically as specified in § 178.955(e) of this subpart.

(b) *Special preparation for the drop test.* Large Packagings must be filled in accordance with § 178.960.

(c) *Conditioning.* Rigid plastic Large Packagings and Large Packagings with plastic inner receptacles must be conditioned for testing by reducing the temperature of the packaging and its contents to  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) or lower. Test liquids must be kept in the liquid state, if necessary, by the addition of anti-freeze. Water/anti-freeze solutions with a minimum specific gravity of 0.95 for testing at  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) or lower are considered acceptable test liquids, and may be considered equivalent to water for test purposes. Large Packagings conditioned in this way are not required to be conditioned in accordance with § 178.960(d).

(d) *Test method.* (1) Samples of all Large Packaging design types must be dropped onto a rigid, non-resilient, smooth, flat and horizontal surface. The point of impact must be the most vulnerable part of the base of the Large Packaging being tested. Following the drop, the Large Packaging must be restored to the upright position for observation.

(2) Large Packaging design types with a capacity of 0.45 cubic meters (15.9 cubic feet) or less must be subject to an additional drop test.

(e) *Drop height.* (1) For all Large Packagings, drop heights are specified as follows:

- (i) Packing group I: 1.8 m (5.9 feet)
- (ii) Packing group II: 1.2 m (3.9 feet)
- (iii) Packing group III: 0.8 m (2.6 feet)

(2) Drop tests are to be performed with the solid or liquid to be transported or with a non-hazardous material having essentially the same physical characteristics.

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(3) The specific gravity and viscosity of a substituted non-hazardous material used in the drop test for liquids must be similar to the hazardous material intended for transportation. Water also may be used for the liquid drop test under the following conditions:

(i) Where the substances to be carried have a specific gravity not exceeding 1.2, the drop heights must be those specified in paragraph (e)(1) of this section for each Large Packaging design type; and

(ii) Where the substances to be carried have a specific gravity exceeding 1.2, the drop heights must be as follows:

(A) Packing Group I:  $\text{SG} \times 1.5$  m (4.9 feet).

(B) Packing Group II:  $\text{SG} \times 1.0$  m (3.3 feet).

(C) Packing Group III:  $\text{SG} \times 0.67$  m (2.2 feet).

(f) *Criteria for passing the test.* For all Large Packaging design types there may be no loss of the filling substance from inner packaging(s) or article(s). Ruptures are not permitted in Large Packaging for articles of Class 1 which permit the spillage of loose explosive substances or articles from the Large Packaging. Where a Large Packaging undergoes a drop test, the sample passes the test if the entire contents are retained even if the closure is no longer sift-proof.

[75 FR 5400, Feb. 2, 2010, as amended at 75 FR 60339, Sept. 30, 2010]

### § 178.970 Bottom lift test.

(a) *General.* The bottom lift test must be conducted for the qualification of all Large Packagings design types designed to be lifted from the base.

(b) *Special preparation for the bottom lift test.* The Large Packaging must be loaded to 1.25 times its maximum permissible gross mass, the load being evenly distributed.

(c) *Test method.* All Large Packaging design types must be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks must penetrate to three quarters of the direction of entry.